

An economic evaluation of herpes zoster vaccination with the recombinant vaccine for adults in Ireland



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Background

Herpes zoster (HZ), more commonly known as shingles, is caused by reactivation of the varicella zoster virus. Only those who have had varicella (chickenpox) can develop HZ, with a lifetime risk of developing HZ of approximately 30%. HZ mainly affects adults and is characterised by a vesicular skin rash, associated with itching and pain, generally lasting up to four weeks. For a minority of people, the pain can persist for several years. This study, conducted as part of a health technology assessment, aimed to estimate the cost utility of vaccination with the recombinant HZ vaccine for the general adult population in Ireland.

Methods

- Using a closed-cohort Markov model, eight alternative age-based, two-dose HZ vaccination strategies were assessed: vaccination of people turning 50, 55, 60, 65, 70, 75, 80 and 85 years of age.
- Clinical effectiveness against incidence HZ, HZ-related hospitalisation and post herpetic neuralgia were included in the model.
- Model parameters including disease incidence rates, transition probabilities, costs and utility values were estimated from published sources and national datasets for Ireland. Parameters for vaccine effectiveness and safety were generated from a de-novo systematic review.
- A base-case vaccine list price of €151 per dose was used.
- Costs and outcomes were estimated over a 50-year time horizon and discounted at a rate of 4%.
- An incremental analysis was conducted where strategies, including no vaccination, were ordered by increasing cost with each strategy compared to the preceding least costly strategy.
- The analysis considered both the publicly-funded healthcare system and societal perspectives.
- The results were assessed against willingness-to-pay (WTP) thresholds of €20,000 and €45,000 per quality-adjusted life year (QALY).
- Sensitivity and scenario analyses were conducted to investigate parameter and model structure uncertainty.

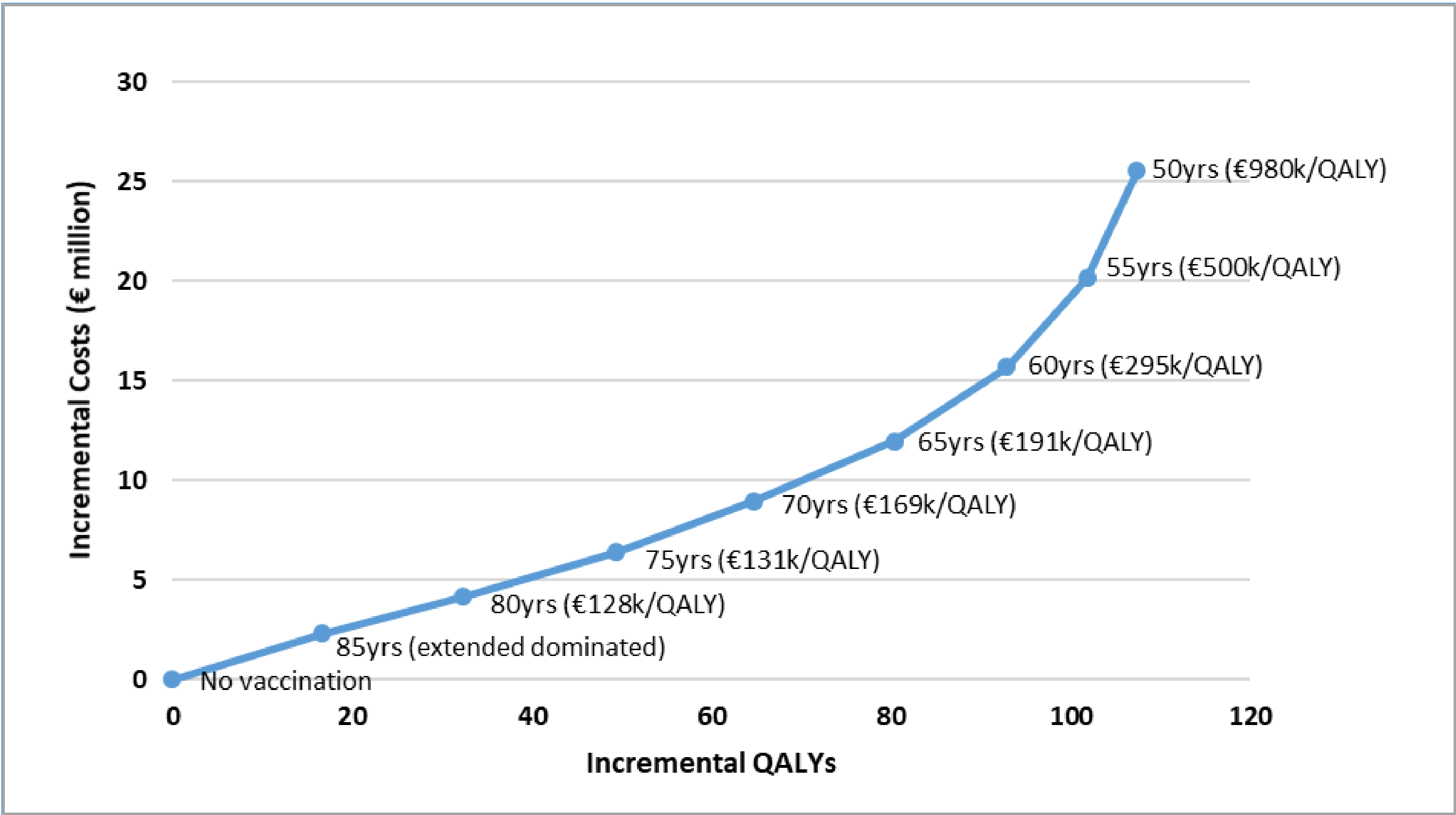
Results

- From both the payer and societal perspectives, the incremental cost-effectiveness ratios (ICERs) for all HZ vaccination strategies assessed, exceeded the WTP threshold of €45,000 per QALY.
- At a vaccine list price of €151 per dose, the ICERs ranged from €127,825 per QALY for vaccination at 80 years old (compared with no vaccination), to €979,815 per QALY for vaccination at 50 years old (compared with vaccination at 55 years old) (**Figure 1**).
- At a WTP threshold of €20,000 per QALY, the probability of any of the HZ vaccination strategies being cost effective was 0%. At a WTP threshold of €45,000 per QALY, the probability of any of the HZ vaccination strategies being cost effective was less than 0.05% (**Figure 2**).
- Based on the model assumptions, the vaccine list price would need to be less than €30 per dose for vaccination at 75 and 80 years old to be cost effective at the WTP threshold of €45,000 per QALY (**Table 1**).
- The results of the economic evaluation were robust to probabilistic and one-way sensitivity analysis and various scenario analyses.

Conclusions

- From both the payer and societal perspectives, vaccination of adults in the general population in Ireland against HZ would not be considered cost effective at a base-case vaccine list price of €151 per dose.
- Substantial price reductions would be required for a limited number of age-based vaccination strategies to be considered cost effective.

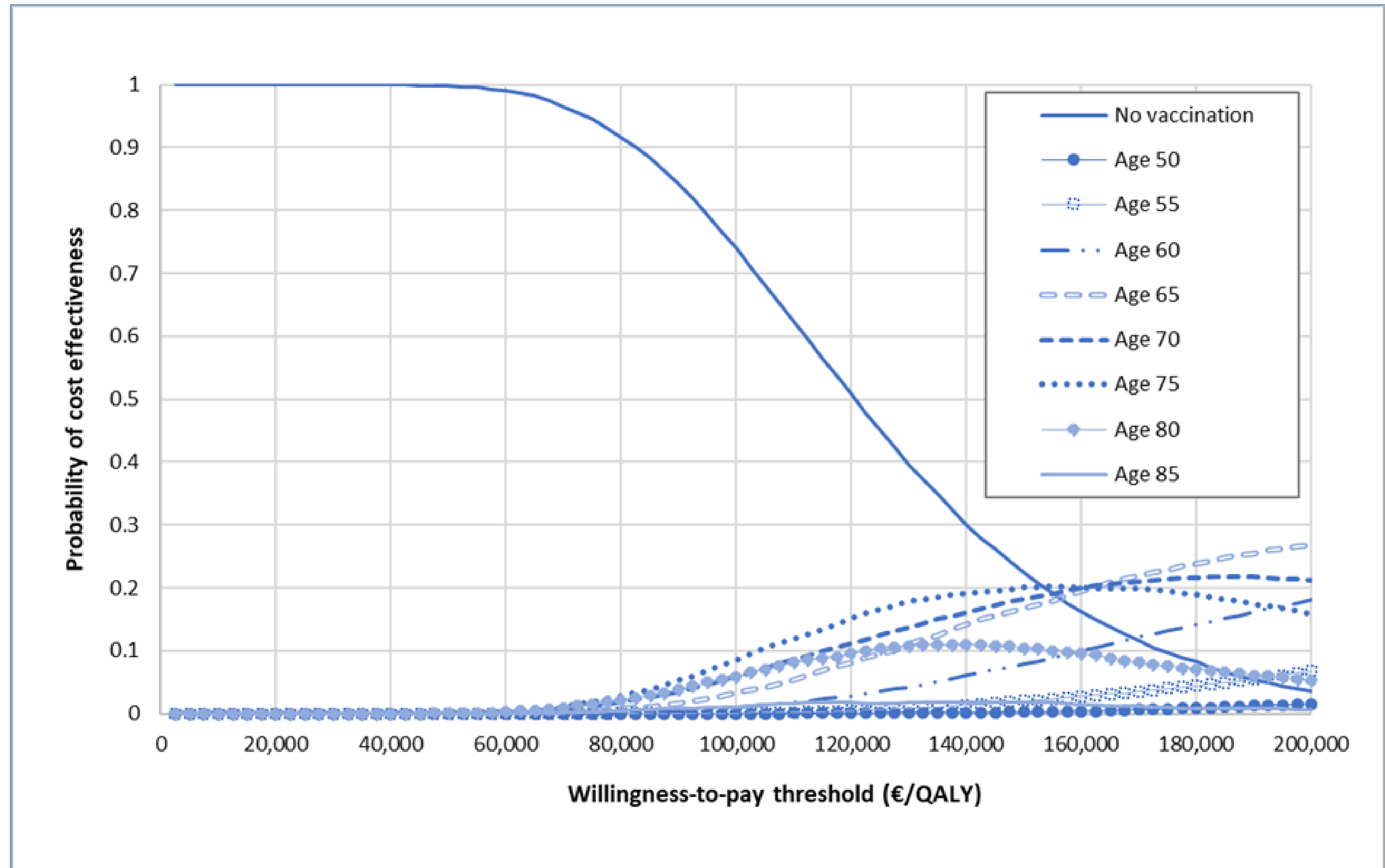
Figure 1 Incremental cost-effectiveness plane for age-based herpes zoster vaccination strategies (payer perspective)[†]



Key: QALY – quality-adjusted life year.

[†]Strategies were ordered by increasing cost with each strategy compared to the preceding least costly strategy.

Figure 2 Cost-effectiveness acceptability curves for age-based herpes zoster vaccination strategies (payer perspective)



Key: QALY – quality-adjusted life year.

Table 1 Threshold analysis of vaccine list price (per dose) on incremental cost-effectiveness ratios (€/QALY) for herpes zoster vaccination (payer perspective)

Age at vaccination (years)	ICER (€/QALY) Vaccine price = €100 (per dose)	ICER (€/QALY) Vaccine price = €50 (per dose)	ICER (€/QALY) Vaccine price = €30 (per dose)
85	101,704 (extended dominated) [†]	59,806 (extended dominated) [†]	43,047 (extended dominated) [†]
80	92,967	54,100	38,553
75	96,099	56,175	40,205
70	124,348	73,003	52,465
65	135,531	76,342	52,667
60	216,634	129,768	95,021
55	383,599	232,480	172,536
50	770,459	463,534	340,764

Key: ICER: incremental cost-effectiveness ratio; QALY – quality-adjusted life year

[†]Strategy classified as extended dominated as the ICER is greater than a subsequent strategy and it is eliminated from ICER calculations.

